Scab Caused by *Gibberella zeae* Occurring on Irrigated Wheat in Eastern Washington

D. A. INGLIS, Former Research Associate, and O. C. MALOY, Extension Plant Pathologist, Washington State University, Pullman 99164

ABSTRACT

Inglis, D. A., and Maloy, O. C. 1983. Scab caused by *Gibberella zeae* occurring on irrigated wheat in eastern Washington. Plant Disease 67:827-828.

Gibberella zeae caused scab in overhead irrigated wheat fields that had been in rotation with corn in eastern Washington in 1982. Neither the fungus nor the disease have been reported previously in the region. The increasing practice of rotating sprinkler-irrigated wheat with sprinkler-irrigated corn probably contributed to the outbreak of the disease.

Additional key words: *Fusarium graminearum*

Fusarium scab of wheat caused by *Fusarium graminearum* Schwabe Group II (=*Gibberella zeae* Petch) is a problem in wheat-growing areas with warm, humid climates during the growing season. Fusarium root and foot rot caused by *F. graminearum* Group I is a problem in areas that are arid and warm (4). Workers in Australia (3,6) have distinguished between the Group I and Group II populations of *F. graminearum*. Group I is mostly soilborne, causes crown rot of cereals and grasses, and rarely forms perithecia in nature or in culture. Group II is mostly airborne, causes diseases of aerial plant parts, and normally forms perithecia abundantly in nature and in culture. In eastern Washington, Group I causes foot rot on small grains grown under dryland conditions but Group II has not been reported in the available disease indices used for the area (1,9,10). In 1982, scab caused by *F. graminearum* Group II (= *G. zeae*) occurred on sprinkler-irrigated wheat grown in Franklin, Adams, and Grant counties. This report presents the first evidence of the disease and the pathogen for the area.

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Present address of first author: Department of Plant Pathology, University of Wisconsin, Madison 53706.

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MATERIALS AND METHODS

Samples of wheat heads with scab collected in midsummer from two fields in Franklin and Adams counties had orange sporodochia on the rachis, glumes, and awns, and in a few instances, underdeveloped perithecia. Kernels were shrunken and discolored and were permeated with mycelium. Samples of wheat heads collected from plants left in the Franklin County field after harvest had sporodochia and *Gibberella* perithecia containing asci and ascospores. Because the field had been in rotation with corn, it was sampled in late fall for *Gibberella* perithecia on old corn stover. *Gibberella* perithecia were abundant on fragments of old stalks and were identical to the *Gibberella* perithecia obtained previously from wheat heads.

F. graminearum was recovered from sporodochia of infested wheat kernels by scraping macroconidia onto acidified cornmeal agar (aCMA) medium (2% Difco cornmeal agar and 0.5% lactic acid), and after 1 wk, transferring colonies to half-strength potato-dextrose agar (½PDA) medium (12.5% sliced potatoes, 1% dextrose, 2% agar). Single-spore isolations from these cultures and from macroconidia produced on scabby heads were made onto ½PDA and carnation leaf agar (CLA) media (5). Cultures were grown at 20 C with a 12-hr alternating light/dark cycle to test whether the fungus produced perithecia in culture. Single ascospores from perithecia obtained from single-spored cultures and from nature were grown on ½PDA and CLA under the same conditions.

RESULTS AND DISCUSSION

Fertile perithecia of *Gibberella* were produced from single-spored cultures of *F. graminearum* on both CLA and ½PDA after 4 wk. Single ascospore cultures made from perithecia obtained from culture and from wheat and corn residues from nature also produced fertile perithecia on CLA and ½PDA after 4 wk. The isolated fungus, based on conidial and colony morphology and presence of perithecia, was identified as *F. graminearum* Group II (= *G. zeae*). Cultures were similar in appearance of macroconidia, ascospores, and perithecia to isolates of *G. zeae* that caused scab on wheat in Nebraska, also in 1982.

In the past, wheat has been grown in irrigated regions of eastern Washington using furrow-irrigation and scab has not been a problem. In 1982, *G. zeae* caused scab on wheat in three counties in eastern Washington where wheat was grown under sprinkler-irrigation. Development of the disease was most likely influenced by humid conditions that prevailed throughout the growing season. *G. zeae* has not been reported previously in eastern Washington. Possibly, this is because the fungus was introduced into the area on infected corn kernels and it has taken time for a population to build up to an observable level or because the fungus has been present but undetectable until sprinkler-irrigation created conditions favoring its appearance. It is of interest that both the Group I and Group II populations of *F. graminearum* occur in the region.

G. zeae is an important cause of stalk

rot of corn in the New England, mid-Atlantic, and northern Corn Belt states (8), but stalk rot of corn is of no documented or known significance to corn in eastern Washington. Corn acreage is increasing substantially in Washington. In 1980, 150,000 acres were grown compared with 106,000 acres in 1972 (2). The practice of rotating irrigated wheat with corn may promote the incidence of scab in the area in the future. High humidity (92–94% RH) and airborne ascospores at the time of anthesis are all the conditions necessary for scab to occur (4). In the Midwest, it is well documented that when wheat follows corn in a rotation, wheat scab is more likely to become severe (7). Wheat scab is of concern in eastern Washington not only because of loss of grain yield but because of the potential hazard that toxic metabolites formed by the fungus may contaminate grain used for feed.

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